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Part 1 of 2

STATE OF NEW MEXICO

IMPLEMENTATION PLAN

FOR THE ATTAINMENT AND MAINTENANCE
OF NATIONAL AMBIENT
AIR QUALITY STANDARDS

JANUARY 1979

AIR QUALITY SECTION

ENVIRONMENTAL IMPROVEMENT DIVISION
HEALTH AND ENVIRONMENT DEPARTMENT

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1. Non-Attainment Areas

a. The Designation Process

The State of New Mexico submitted the first State Implementation Plan for attainment of ambient air quality standards in 1972. This plan provided for reductions in emissions from stationary sources throughout the state and outlined regulatory, enforcement and ambient air monitoring programs to assure the attainment and maintenance of these standards. Some significant improvements in air quality have been witnessed over the last five years; however, there remain several areas where the standards are still exceeded. Statewide, certain sources of particulate matter, sulfur dioxide, carbon monoxide and ozone, have been difficult to effectively control. The 1977 federal Clean Air Act Amendments have attempted to revitalize the 1970 Clean Air Act (which provided for attainment of standards by 1975 for most pollutants), with new provisions which outline a stronger program for bringing these non-attainment areas into compliance by December 31, 1982. This plan revision specifically addresses those non-attainment areas. The State must also protect air that is cleaner than federal standards and plans to adopt Prevention of Significant Deterioration regulations to achieve this end.

Up to now, National Ambient Air Quality Standards (NAAQS) have been established, to protect health and welfare, for sulfur oxides (SO_x), particulate matter (TSP), carbon monoxide (CO), photochemical oxidants (O_x measured as ozone), and nitrogen oxides (NO_x). (A national lead standard has been proposed and the State is now analyzing emissions inventories and ambient data as part of the plan development process for a lead "mini" S.I.P. to be submitted to the E.P.A. in July of 1979.) The Amendments also directed the U.S. E.P.A. to investigate the necessity of promulgating a short-term NO_2 standard which is expected to be issued this winter. In addition, the necessity of inhalable particulate standards is being researched by the E.P.A. for possible promulgation. Existing NAAQS are shown in Table I-2.

The national primary standards define levels of air quality which the EPA Administrator judges necessary to protect the public health with an adequate margin of safety. Secondary standards define levels of air quality which the EPA Administrator judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

The new Clean Air Act Amendments (1977) were signed into law by President Carter on August 7, 1977. Still leaving the responsibility for attainment and maintenance with the States, Congress required the states to designate all Air Quality Control Regions, or portions thereof, according to whether they meet

TABLE I-2

Ambient Air Quality Standards

<u>National Standards</u>	<u>Primary*</u>	<u>Secondary**</u>
Carbon Monoxide (CO)	35 ppm hourly average, not to be exceeded more than once a year 9 ppm eight hour average, not to be exceeded more than once a year	same as primary
Nitrogen Dioxide (NO ₂)	0.05 ppm annual average	same as primary
Non-methane Hydrocarbons ⁺	0.24 ppm 6-9 a.m. average, not to be exceeded more than once a year	same as primary
Photochemical Oxidants	0.08 ppm hourly average measured as ozone, not to be exceeded more than once a year	same as primary
Total Suspended Particulate Matter	260 µg/m ³ 24-hour average, not to be exceeded more than once a year. 75 µg/m ³ annual geometric mean	150 µg/m ³ 24-hour avg., not to be exceeded more than once a year 60 µg/m ³ annual geometric mean ⁺
Sulfur Dioxide (SO ₂)	365 µg/m ³ (0.14 ppm) 24-hour average, not to be exceeded more than once a year 80 µg/m ³ (0.03 ppm) annual average	1,300 µg/m ³ (0.5 ppm) three hour average, not to be exceeded more than once a year

* Primary standards define levels of air quality which the U.S. Environmental Protection Agency's (EPA) Administrator judges necessary to protect the public health with an adequate margin of safety.

** Secondary standards define levels of air quality which the EPA Administrator judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

⁺ These are for use as guides in achieving other standards. The non-methane hydrocarbon level relates to the oxidant standard; the 60 µg/m³ geometric mean relates to the 24-hour standard for particulates.

all of the NAAQS for the five criteria air pollutants. New Mexico examined the most current emissions, monitoring and modeling data available to the state by the end of November of 1977. The proposed designations were submitted to the EPA on December 5, 1977. A public hearing was held before the New Mexico Environmental Improvement Board (EIB) on January 13, 1978 for two major reasons. First, the designation process itself must weigh numerous factors and arrive at conclusions through considerable judgment and interpretation. Secondly, the impact of the designations and subsequent restrictions on economic development in the state would be of considerable interest to a significant portion of New Mexico residents.

As a result of Agency testimony and public comment presented at the hearing, the Board unanimously adopted the designations as proposed by this agency -- with two amendments based on testimony related to CO, given by the Albuquerque - Bernalillo County Air Quality Control Board and to SO₂, given by the Kennecott Copper Corporation. These amendments were then forwarded to the U.S.E.P.A. for their final promulgation. In March, 1978, the U.S.E.P.A. published their proposed revisions to New Mexico's designations and solicited further public comment. After carefully considering these inputs from the New Mexico E.I.D., industry and the general public, E.P.A. issued final attainment/non-attainment designations in August of 1978. The comments and final EPA designations are briefly summarized below. Detailed descriptions are found further on in this chapter on Tables 1-3 to 7.

Nitrogen Dioxide (NO₂)

A designation of attainment for the entire State was proposed by the Section and accepted by the U.S.E.P.A.

Carbon Monoxide (CO)

Selected corridors and/or large area sources within the cities of Las Cruces, Farmington and Santa Fe were designated as non-attainment based on violations of the 8-hour CO standard during 1976-1977. The EIB concurred with the Albuquerque-Bernalillo County Air Quality Control Board recommendation that Bernalillo County in its entirety be designated as non-attainment for the 8-hour CO standard. The outer boundary of the Coronado-Winrock Shopping Centers encloses the area designated as non-attainment for the 1-hour CO standard. U.S.E.P.A. accepted these proposals with no amendments.

Total Suspended Particulates (TSP)

U.S.E.P.A. accepted EIB proposals to designate as non-attainment portions of AQCR #155 impacted by the potash refineries. Sufficient ambient data was not available to make these determinations; dispersion modeling was utilized to predict a radius around each refinery where violations of ambient standards could be expected.

Table I-5 Sulfur Dioxide Designations

Designated Area	Primary Standard Exceeded	Secondary Standard Exceeded	Unclassifiable	Attainment
All of AQCR 152				X
All of AQCR 153				X
All of AQCR 154				X
All of AQCR 155				X
All of AQCR 156				X
All of AQCR 157				X
In AQCR 014: Any land above 6400 feet MSL in San Juan County of New Mexico east of longitude 108° 40', west of longitude 108° 10' and north of latitude 36° 50' (Mesa Verde Plateau)				
	X (24 hr.)			
Any land above 6000 feet MSL in San Juan County of New Mexico south of latitude 36° 50', north of latitude 36° 35, west of longitude 108° 30', and east of longitude 108° 40' (The Hogback)				
	X (24 hr.)			
A circle with a radius of 2.5 miles around the Four Corners Power Plant located at T.29 N., R.16W., sec. 36, NW ¼ NW ¼ in San Juan County				
	X (24 hr.)			
The remainder of AQCR 014				
				X
In AQCR 012: A circle with a radius of 3.5 miles around the Kennecott Copper Smelter near Hurley, NM located in the middle of T.18S., R.12W, sec.31 in Grant County				
	X (24 hr.)			

Table I-5 Con't.

Designated Area	Primary Standard Exceeded	Secondary Standard Exceeded	Unclassifiable	Attainment
Any land above 6470 feet MSL within 8 miles of the Kennecott Copper Smelter near Hurley, NM	X (24 hr.)			X
The remainder of AQCR 012				

U.S.E.P.A. amended other Board designations for final promulgation as follows:
(1) Radii of one mile around five Albuquerque high-volume sampling sites which recorded violations during 1976-1977, were designated as non-attainment, and (2) a 4.5 mile radius around the Kennecott Copper Corporation smelter at Hurley was designated as non-attainment for the particulate matter primary standard.

The E.P.A. fugitive dust policy directs concern to particulate matter of industrial origin or potentially harmful particulate matter due to its adsorption of toxic elements. Therefore, violations of particulate standards, which can be considered to be rural (native soils) in character, did not serve as the basis for non-attainment designations.

Sulfur Dioxide (SO₂)

E.P.A. accepted Section dispersion modeling which showed that the Federal primary SO₂ standards could be exceeded within a 2.5 mile radius of the Four Corners Power Plant, as well as an area west of the plant known as the "Hogback" and a portion of the Mesa Verde Plateau. Consequently, these areas were designated as non-attainment for SO₂.

The final E.P.A. non-attainment designation for the Hurley area, within AQCR #012, is restricted to a 3.5 mile radius around the Kennecott Copper Corp. and land above 6470 feet MSL within an 8 mile radius of the smelter. The non-attainment designation applies to the federal primary and secondary SO₂ standards.*

Photochemical Oxidants (O_x) (Measured as Ozone)

Although the accuracy and precision of the ozone monitors operated during 1975-1976 were judged to be acceptable, the data collected is not considered valid because the State has not had the calibrators with which to follow a prescribed calibration schedule. Consequently, areas where high values for ozone have been recorded during this period, and where violations of the NAAQS are suspected, were designated as unclassifiable by the Section. These "suspect" areas included the cities of Albuquerque and Las Cruces along the Rio Grande, as well as portions of Lea and Eddy counties.

E.P.A.'s final recommendation designates that portion of the Rio Grande Valley within Bernalillo County as non-attainment for O_x and the rest of the State as unclassifiable. In fact, E.P.A. has "automatically" designated all urban areas in the U.S. with populations of over 200,000 as non-attainment for this pollutant.

*As will be described further on in this Plan a recent analysis by consultants Engineering Science, Inc. indicates that smelter and smelter-related emissions actually contaminate a smaller area than that presently designated. Control strategies for this SO₂ non-attainment area are based on this re-defined area. (See "Control Strategies").

b. General Rationale Behind the Designations

Areas had to be designated as meeting or not meeting each of the standards for each of the criteria pollutants. Insufficient data resulted in an unclassifiable designation which, under the 1977 Amendments, requires additional ambient monitoring to determine attainment status. A jargon has developed to describe whether or not the NAAQS are being met. If the standards are being met, they are "attained" and the area throughout which they are attained is called an "attainment area". Similarly, if the standards are not being met, they are "not attained" and the area throughout which they are not attained is called a "non-attainment area".

Each air quality control region (AQCR), or portion thereof was designated using ambient air quality data and/or dispersion modeling along with, hopefully, a good measure of scientific judgement and common sense. The guidelines presented in the letter from EPA (Section VI) were followed in arriving at designations for each AQCR which met the requirements of the 1977 Amendments as follows:

- (A) do not meet a national primary ambient air quality standard for oxidants, carbon monoxide or nitrogen dioxide;
- (B) do not meet, or in the judgement of the State may not in the time period required by an applicable implementation plan attain or maintain, any national primary ambient air quality standard for sulfur dioxide or particulate matter;
- (C) do not meet a national secondary ambient air quality standard;
- (D) cannot be classified under subparagraph (B) or (C) above on the basis of available information, for ambient air quality levels for sulfur oxides or particulate matter; or
- (E) have ambient air quality levels better than a national primary or secondary air quality standard for oxidants, carbon monoxide, or nitrogen dioxide, or for which there is not sufficient data to be classified under subparagraph (A) or (C) above.

All areas included in categories (A) through (C) are deemed non-attainment areas, while all areas included in categories (D) and (E) are classified as attainment or unclassifiable areas.

Air quality data (i.e. data on measured pollutant concentrations in ambient air) is used to determine whether the standards are attained. When data is compared to the standards, the averaging time and frequency must be the ones

specified in the standard. In New Mexico, 25 of the 32 counties have monitors to measure ambient concentrations of air pollutants. However, when comparing the monitoring location and county population maps, pollutant concentrations are monitored more intensely in areas where the most people are likely to be affected. In most cases, the current monitor locations cover the points where pollutant levels are expected to be highest even though some background monitoring is being done in New Mexico.

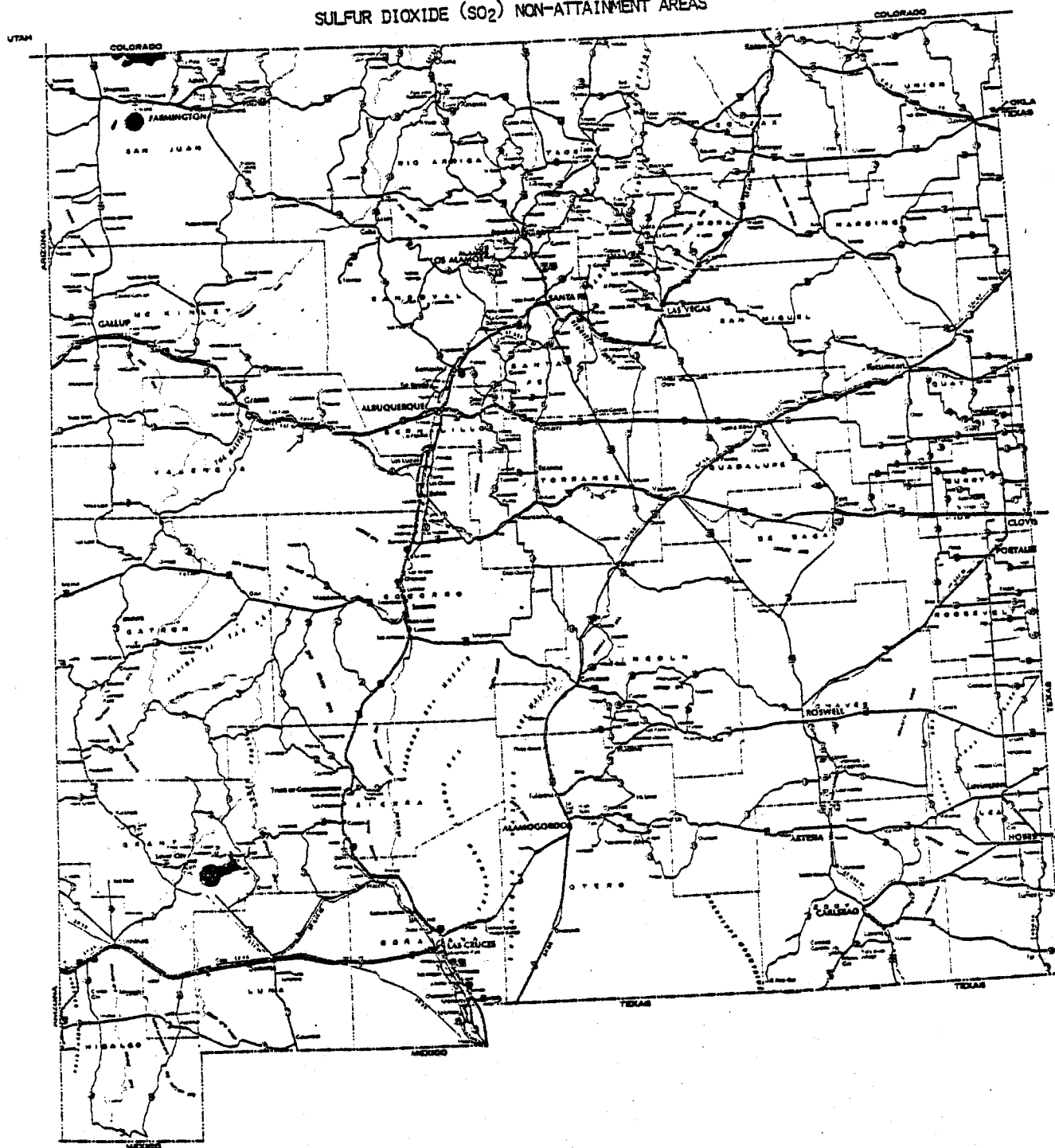
Information on the emissions for all significant sources of air pollution in every county is also available from the 1975 emissions inventory. Although this information cannot be compared to the standards, it supplements the ambient air quality data. Dispersion modeling is also used to predict ambient ground level concentrations.

The 1977 amendments required designation as of the date of enactment (August 7, 1977). For the standards that require an annual mean (average), 1976 data are used, as calendar years are the conventional averaging period and 1976 is the most recent year available. If there were not violations recorded in 1976, data for 1975 was examined. Other than for carbon monoxide, where some 1977 data was utilized, the 1975-76 ambient data compiled in the publication "State of New Mexico Ambient Air Quality Data Summaries 1973-1976" was utilized in assessing attainment status for each pollutant. Because there are different numbers and types of monitors for different pollutants, and because the pollutants behave differently, the procedures for using and interpreting the data differ. In each case, except where the entire State appears to meet a standard, it must be emphasized that judgement is involved in designating non-attainment areas.

Maps delineating the non-attainment areas for CO, TSP, SO₂ and O_x are presented as figures I-5 through I-12 respectively.

Figure I-11

SULFUR DIOXIDE (SO₂) NON-ATTAINMENT AREAS



The black areas in San Juan and Grant County are non-attainment for sulfur dioxide. The rest of the State is attainment.

E. CONTROL STRATEGY EVALUATION FOR ATTAINMENT AND MAINTENANCE OF NATIONAL AMBIENT AIR QUALITY STANDARDS FOR SULFUR DIOXIDE AND TOTAL SUSPENDED PARTICULATES IN GRANT COUNTY

The non-attainment area for TSP around Kennecott's copper smelter at Hurley is a relatively small area as shown by the accompanying map which shows the isopleths of modeled annual TSP concentration. The measured TSP at a number of locations around the smelter have shown that both the federal primary, and secondary standards for total suspended particulates (TSP) are currently being exceeded. There is no single cause for these violations but rather it is a result of several sources of particulate emissions. Among these emission sources are fugitive emissions from concentrate feed, silica flux and limestone storage piles, in plant roads, Hurley roads, the converter aisle and dry particulate control equipment and emissions from the lime manufacturing plant and refinery furnace.

The non-attainment problem with respect to sulfur dioxide (SO_2) extends a greater distance away from the smelter than do the localized TSP problems. Monitored data have shown violations of federal standards even with a supplementary control system. Points of SO_2 emissions are from the reverberatory furnace stack, fugitive emissions from the converter aisle, and the acid plant stack. Fugitive process SO_2 emissions result from leaks around waste heat boilers, matte tapping, and other converter aisle operations. Presently, the fugitive SO_2 emissions are significant (estimated at approximately 66 tons of SO_2 per day), being released at heights of 80 to 100 feet above ground level.

In order to achieve attainment of standards, it was necessary to develop a number of regulations and to modify existing regulations.

Control Strategy for TSP

A complete source emissions inventory within a 5 mile radius of the Kennecott smelter at Hurley is given in Table III-36 which lists the source, the current controls, the estimated emissions and the methodology for arriving at these estimates. Not all of these sources have the same impact on air quality; therefore, the AQDM model was used to estimate existing annual ambient air quality concentration levels. Because of the multitude of emission sources and the lack of detailed hourly TSP emission data, it is impossible to model the short-term particulate concentrations. Experience has shown that a calibration of an annual model is possible. Therefore, only the annual concentrations of TSP were attempted to be matched.

reverberatory feed dryer, the refinery furnace are set at RACT.

The percentage of credit in emission reductions for the various sources controlled by Regulations #506, #509, #510, and #511 are as follows:

- 1) lime kiln - 90% reduction
- 2) lime crushing - 90% reduction
- 3) ESP dust loadout - 95% reduction
- 4) reverberatory feed storage - 95% reduction
- 5) converter aisle, transfer points - 30% reduction
- 6) Kennecott plant traffic - 50% reduction
- 7) Hurley roads - 40% reduction

Demonstrated control for converter aisle transfer points is estimated at 65% emission reduction; however, we are only taking credit for 30% reduction since we are not requiring secondary converter hooding. Kennecott plant traffic controls are estimated at 70% reduction but we are claiming only 50% reduction, and Hurley roads for complete paving and sweeping would result in an estimated 70% reduction. The regulation was written to allow for graveling or dust suppression and therefore only a 40% reduction credit was assumed. These measures would achieve the NAAQS for particulates. Table III-40 shows the emissions inventory after controls are applied. Table III-41 shows the modeled annual TSP concentration and Figure III-20 shows the TSP concentration isopleths as a result of the controls.

Control Strategy for Sulfur Dioxide

A complete emissions inventory of sulfur dioxide (SO_2) emissions is presented in Table III-42, which lists the source current emissions and current controls. The air quality impact of these emissions is not proportional to the rate of emissions because of the difference in height of the release points. The geographic locations where maximum concentrations are expected to occur are also a function of the specific meteorology. In general, however, there are presently three situations which lead to elevated concentrations. These are (1) unstable plume looping where both the reverberatory stack emissions and fugitive emissions produce high concentrations close to the plant, (2) stable drainage where principally the low level fugitive emissions result in high concentrations near ground at substantial distances from the plant and, (3) stable flow which directs the reverberatory plume to high terrain.

Present monitoring data for SO_2 has shown that federal standards have been exceeded and modeling has supported this conclusion. This situation is due in part to fugitive process SO_2 emissions. The monitoring data is influenced by

TABLE III-42 EMISSIONS INVENTORY, KENNECOTT SMELTER, HURLEY, NEW MEXICO

<u>SOURCE</u>	<u>CURRENT CONTROLS</u>	<u>ESTIMATED EMISSIONS (lb/hr)</u>	<u>ESTIMATE METHOD</u>
Reverb. furnace	SO ₂ : none	16,700 to 23,700	Ecology Audits source test
Fugitive	SO ₂ : limited hooding	approx. 5,500 lb/hr	Sulfur balance, computer modeling
Power plant	SO ₂ : none	85	1977 fuel oil usage & sulfur content
Converter acid plant	SO ₂ : acid plant	106	Ecology Audits Source test

the operation of a supplementary control system (SCS) and so it is difficult to say what the maximum concentrations at the monitoring sites would have been had steps not been taken to reduce smelter emissions. Additionally, the monitoring data does not give the necessary information to assess what contributions are attributable to the various sources of SO₂ emissions. Two computer models were used to determine the relative contributions from the present emission sources. The two models used were the AQDM model which was used to match the annual concentrations and the PTMTP model which was used to determine short term 3 hour and 24 hour concentrations. A comparison of the AQDM predictions and the monitoring observations for SO₂ is shown in Table III-43. The correlation coefficient for all pairs of data is 0.884. This says that the AQDM model is predicting the trends in the data quite well. While it may appear that the model is overpredicting, remember that the SO₂ observations are biased downwards as the result of the SCS measures and additionally, there are about three months of missing data. It is possible that the estimated emission rate for fugitives is too high. Notwithstanding this, it was determined that in order to meet state standards, all but 500 lb/hr of fugitives would need to be captured and either treated or vented at a reasonable level above ground. In limiting fugitives to approximately 500 lb/hr, the required reduction over present fugitives is approximately 90% for the meteorological condition of stable drainage flow.

For the plume looping and high terrain concentrations the PTMTP model was utilized assuming that the captured fugitive emissions are untreated and vented through the existing converter stack. In addition, the plant configuration for the ultimate control level assumed that the reverberatory offgases were scrubbed or that the reverberatory furnace was replaced and the offgas from the new process was either scrubbed or treated by an acid plant. The existing reverberatory stack was assumed to be used for upset conditions only and a new stack which is integral with the control equipment would be constructed. That stack would have a height of 250 to 300 ft. The model predicted that an SO₂ limitation of 7000 lb/hr for both unstable plume looping and high terrain would be needed to protect the Federal secondary ambient air standards. The total emission rate applies to the acid plant stack, fugitive vent stack, and furnace stack.

The control strategy for the non-attainment of SO₂ standards is contained in Regulation 652 Non-Ferrous Smelters - Sulfur. It should be noted that Regulation 652 places no numerical limit on the control of fugitives but rather defines the conditions which must be met for the control of fugitives. For the smelter, the ultimate limit to meet Federal secondary standards, expressed as sulfur is 3550 pounds per hour (running 24-hour average), which includes sulfur emissions from the acid plant, and all captured and vented fugitive SO₂ emissions.

TABLE III-43

Annual Arithmetic Mean Sulfur Dioxide Comparison Using AQDM for 1977

<u>Site</u>	<u>Observed</u> <u>($\mu\text{g}/\text{m}^3$)</u>	<u>Predicted</u> <u>($\mu\text{g}/\text{m}^3$)</u>
EID-Hurley	-	63
EID-Bayard	16	52
Ft. Bayard	10	32
Bayard	18	51
Geronimo	25	63
Golf Course	39	249
Weather Tower	20	163
Hurley Shops	-	4
S. Hurley	-	94
Bolton	36	180
Mimsiville	21	166
Shady Brook	40	268
Nob Hill	38	268
max. predicted	-	446